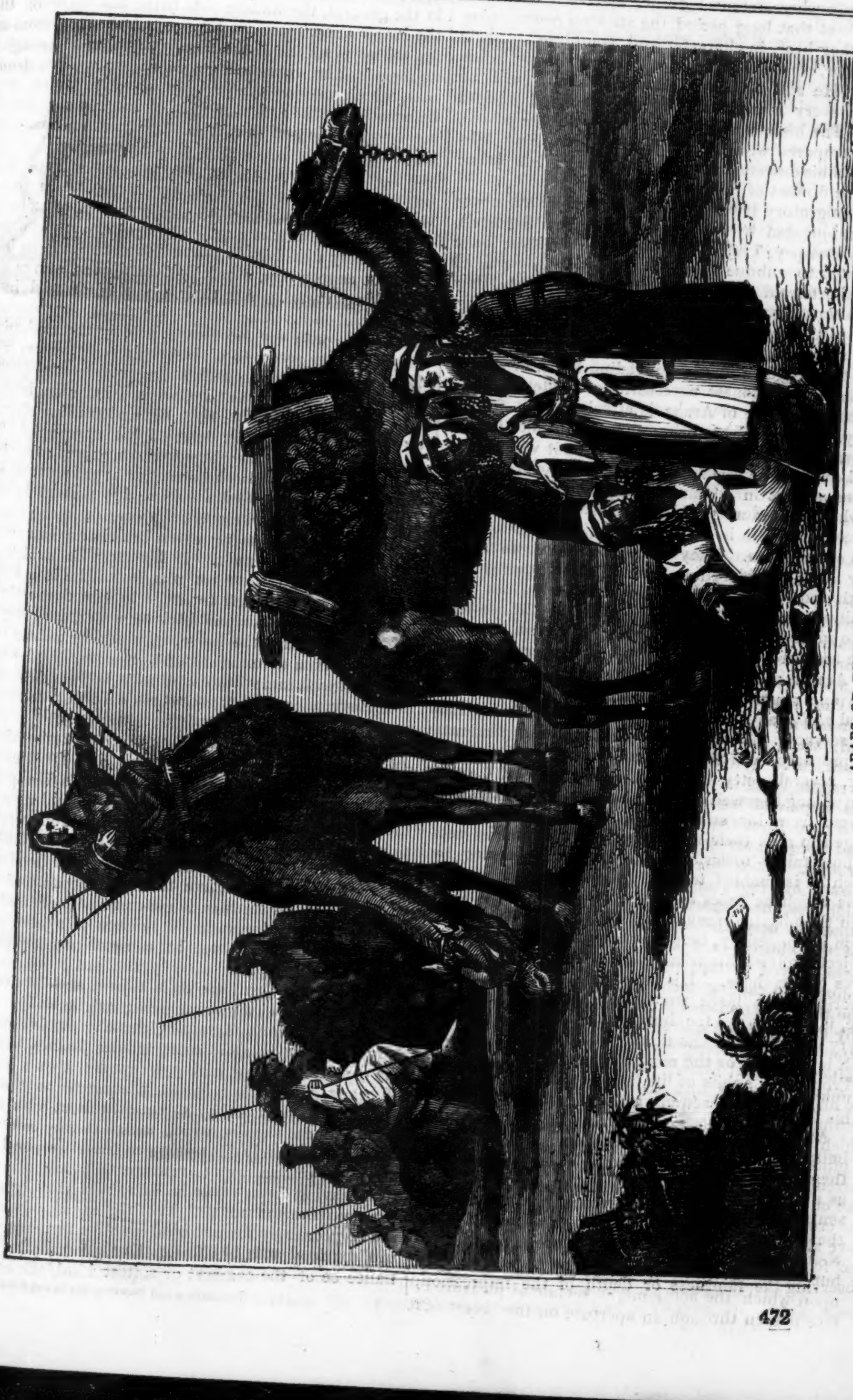
THE

Saturday Magazine.

MAY THE SOUL BE WITHOUT KNOWLEDGE IT IS NOT GOOD

Nº. 472. NOVEMBER 9TH., 1839. { PRICE ONE PENNY.



ARABS OF THE DESERT.

THE ARABS OF THE DESERT.

IN the wild and trackless regions of the Arabian desert, in that barren land where no other human beings could long exist; without fixed habitations, without any of those comforts which we are accustomed to consider as necessary to the enjoyment of life, dwell the wandering lawless tribes, the descendants of Ishmael. For more than 3700 years, they have inhabited the wilderness where Ishmael dwelt; and have displayed throughout that long period, the striking resemblance which they bear, in character and condition, to their progenitor, of whom it was declared, previously to his birth, "He will be a wild man; his hand will be against every man, and every man's hand against him." The history and manner of life of these people, when compared with the prophecies concerning Ishmael and his descendants, afford a remarkable instance of the fulfilment of Scriptural predictions.

The migratory tribes of Bedouin Arabs have never been subjugated by foreign conquerors. Sesostris, Cyrus, Pompey, Trajan, and other sovereigns, have attempted to subdue them; but though they gained some short-lived triumphs over detached tribes, they were ultimately obliged to abandon their undertaking, owing to the very nature of the country, which is on three sides surrounded by the sea, and cannot be made to harbour a foreign invading force, or supply it with the commonest necessaries of existence.

When any tribe of Arabs is attacked by a foreign enemy, all the neighbouring chiefs will unite in the common cause; and though they are not without internal discord, or free from the evils of warfare among themselves, yet in a time of danger which threatens the whole community, they speedily forget their differences, and join in valorously resisting the aggressions of their foe. They value their freedom above every other consideration; and all the allurements of wealth and luxury are unable to win them from their primitive mode of life and government. Those who reside in towns, or very near the sea-coast, have in some measure lost their original character; but the true Arab is always a dweller in tents, and a wanderer, from one generation to another. Their nobles are called *sheiks*, and bear absolute rule over their families and servants. If unable to defend their dependants and property from the attacks of some hostile neighbour, several petty sheiks unite, and choose a chief from among themselves. The sheik receives no yearly income from his subjects, but is, on the contrary, obliged to seek their favour by presents, and by acts of hospitality towards strangers. The means by which he is enabled to defray these expenses, are the sums which he levies in tribute or plunder, or obtains from the pilgrim-caravans. Mounted on his horse, or on a dromedary, he goes every day to inspect his subjects, to visit his friends, or to indulge in the pleasures of the chase. His repast is of the most simple description: a large wooden dish, filled with boiled rice, is served up for him and his friends; and one party after another sits down to partake of it, till the dish is emptied, or the company satisfied.

From their habits of life, and constant exposure to the air, the Arabs acquire a wonderful power of discerning distant objects, as well as of hearing sounds, which to persons with less accustomed eyes and ears, is quite astonishing. Their sense of smelling, too, is extremely quick, and easily offended: hence their dislike of houses and towns, where the exhalations from the crowded habitations fill them with disgust. They have also a most singular faculty of distinguishing the footsteps of men and animals on the sand. By observing the faintness or depth of the impression, and the intervals between each step, an Arab judges with surprising accuracy, as to whether the individual carried a load or not, whether he was fatigued, and whether it would be possible to overtake him. He can distinguish with equal facility the footmarks of camels: being able to track his own camel in a sandy valley where thousands of other footsteps mark the road in all directions.

The tents of the Bedouins are made of coarse dark-coloured cloth, extended over seven or nine poles fixed in the ground, the middle pole being the highest. In the larger ones, there are two or three compartments for the separate use of the men, women, and domestic animals. The furniture consists merely of a straw mat, which answers the purpose of table, chairs, and bedstead; and of a few articles of kitchen use which are very simple and portable. The pots are made of tinned copper; the dishes of the same material, or of wood. They have neither spoons, nor knives and forks. A round piece of leather serves them for a table-cloth, and in this they preserve the remains of the meal. Water is kept in goat-skins; and butter, which easily dissolves in that climate, in leathern bottles. A copper cup, carefully tinned over, serves for a drinking vessel. All their grain is ground in a small hand-mill. The cordial hospitality of primitive times still continues to be exercised by the Bedouins. They are ever ready to divide their scanty meal with the hungry wanderer; and there is even a generous rivalry among them, as to who shall have the honour of calling him his guest: that distinction being claimed by the Arab who first descried his approach. The hours of hospitality are, however, numbered: for three days and eight hours the stranger is considered as a ward; food is provided for him; his person is considered sacred; and he may fully confide in the fidelity of his host, after having eaten bread and salt under the covering of his tent. If his stay be prolonged, however, beyond the term mentioned, he is a simple visiter, and is expected to assist in the domestic affairs of the tent, such as fetching water, milking the camel, or feeding the horse. Should he refuse to do this, he is even then permitted to remain; but he is reproached with ingratitude, and soon finds it pleasanter to remove to another tent, where he will meet with a fresh welcome, and ready entertainment.

In the journeys of the Arabs through the desert, and in the removal of their tents, their families, and furniture, how indispensable to them is the patient camel! Justly do they esteem this animal as one of the most precious gifts of Providence; and very appropriately have they named it the "Living Ship of the Desert;" for without its aid, it would be impossible for them to traverse the wide oceans of sand with which their country is covered. The camel does not attain its full growth till the age of twelve years, though it is fit for use at a much earlier period. It will live as long as forty years, but loses much of its activity by the time it is thirty, and is then no longer capable of enduring great fatigue.

The expense of maintaining these valuable creatures is remarkably small: during a long journey through the desert, a cake of barley, a few dates, or a handful of beans, will suffice them, in addition to the hard and prickly shrubs they sometimes meet with by the way. These shrubs, which are so thorny and sharp as to be extremely distressing to travellers, and which no other animal would venture to touch, are so far from having been made in vain, that they constitute the nourishment and delight of the camel, whose teeth are so peculiarly formed as to enable him to chew such prickly food with comfort. But, whether his sustenance be of the coarsest or softest kind, the camel is

equally prepared to enjoy it; for his upper lip being divided, he is enabled to nip off the tender shoots, and turn them into his mouth with the greatest facility. The young and fresh leaves of the acacia trees are peculiarly grateful to him; and the Bedouins spread mats under these trees, and beat the boughs for a supply of food from thence for their camels. The chief services for which camels are employed, are riding and carriage. The term *deloul*, is applied to those which are trained for the saddle; and they are generally very docile, and travel at an easy, pleasant pace. In the province of Hejaz, the Arab women use a kind of palanquin, having a seat placed across the saddle, with cross-bars above, over which mats or carpets are spread to screen the traveller from the sun. The Bedouin never sets out on a long journey without examining the hump of his camel. If it be large, he is well assured of the animal's power to endure fatigue and hunger; but if it be the contrary, he knows that his camel will soon give way under his load, and become unfit for further exertion. A long journey will cause the hump almost entirely to disappear; but rest and nourishment soon restore it.

The most celebrated animal of Arabia, however, is the horse; and there, that noble quadruped may certainly be found in the greatest perfection. The Arabs bestow on it a great degree of care and affection, not only on account of its great utility, but because they have a notion that it is endowed with intelligence above all other creatures, and that it is the peculiar favourite of Heaven. Their prophet Mohammed is said to have thus related to them his own account of the creation of this animal.

When God wished to create the horse, he called the south-wind, and said, "I desire to draw from out of thee a new being; condense thyself by parting with thy fluidity,"—and He was obeyed. "Thou shalt be for man," He said, "a source of happiness and wealth; he will render himself illustrious by ascending thee."

These animals are generally of a middle size, light and active, slender, and delicately formed, of surprising swiftness, and capable of bearing great fatigue, and of a gentleness of disposition which makes them easily manageable, even by women and children. Their owners are particular in tracing their pedigree, which is often written out, enclosed in a leathern bag, and suspended round the animal's neck.

The Bedouins seem quite ignorant of the tricks which are practised by Europeans in the sale of horses, and are careful to give an exact and true account of the qualities of the animal, from a belief that they and their families would be subjected to a curse, were they to use deceit in so important a matter. A stranger may, therefore, purchase from them, and take their word with a degree of confidence which he knows it is impossible to place in his European brethren, accustomed as they unhappily are to swerve more or less from truth, in bargains of this nature.

It is a real grief to an Arab to be obliged to sell his horse. The animal has been so often fondled and caressed by the whole family, and is on such affectionate terms with them, that they almost cease to consider him of an inferior nature to their own; but address him in the language of endearment, and tell him of their joys and sorrows. The love and care bestowed on their horses is an amiable feature in the Arab character, and one which perhaps is more generally known than any other, on account of the numerous anecdotes which are commonly told to illustrate it.

But we must not suppose that this pleasing trait, united with that of their hospitality towards strangers, (which latter virtue would seem to be sometimes practised through pride, and through fear of the disgrace which attends the neglect of that ancient custom,) is indicative of general kindness of disposition, and gentleness of character in these wandering tribes. Their system of plunder, not only of strangers, but of their own fraternity, contradicts such an idea; while their quickness to take offence is such, that the slightest expression of contempt can only be expiated by the blood of the offender.

Their qualities are of a very contradictory nature; they are fierce and revengeful, yet they are not strangers to pity and gratitude; they are addicted to low vices, and yet very jealous of their honour. Their religion is a mixture of fanaticism and infidelity, and has little hold on its professors, beyond a few outward observances.

TRUTH.

Upon this wonderful and glorious ALL
I look, and see, there's nought destroyed, or lost,
Though all things change. The rain-drops gently fall,
But die not where they fall. Some part doth post
Swiftly away on wings of air, to accost
The summer clouds, and ask to sail the deep
With them, as vapoury travellers, or frost.
Some part anon into the ground doth creep,
And maketh the sweet herbs and flowers to grow,
Or oozeth softly through the dark, deep earth,
Teaching the streamlet under ground to flow,
Till forth it breaks with a glad sunshine birth—
Ripples a dancing brook—then flows a river—
Then mingles with the sea, the air, circling for ever.

Even so I looked on the vast realm of Truth,
And saw it filled with spirit, life, and power;
Nought TRUE did ever die. Immortal youth
Filled it with balmy odours; from the hour
It first dropped gently from its upper shower
On high, swiftly it flew away, or sank.
Awhile amid the darkness that doth lower
Below, it seemed to struggle. But earth drank
The drop. From heart to wakening heart it sped—
From sire to son—from age to age it ran;
It swelled the stream of Truth. It is not dead,
But flowing, filleth every want of man.
It NEVER dieth—nor *can* ever die,
Circling from God to God, through all eternity!

Yea, Truth, immortal as its primal source,
Once uttered, once set free, shall never rest.
O, Father! hath it such undying force
When unrevealed, and left without attest
Of miracle from Thee, and unconfessed
By man; and shall not Thine own WORD go forth,
In all its fulness, through these times unblest,
Till it shall reach all corners of the earth?
If one small trembling drop is ne'er destroyed,
But runneth, a bright messenger from Thee,
Shall Thy own living streams 'return back void,'
And not fulfil their saving ministry?
O, no! Even now I see them spreading wide,
With life and beauty, on the pure, deep, swelling tide!

C. P. CRANCH.

THE profoundly wise do not declaim against superficial knowledge in others, so much as the profoundly ignorant; on the contrary, they would rather assist it with their advice than overwhelm it with their contempt; for they know that there was a period when even a Bacon or a Newton were superficial; and that he who has a little knowledge is far *more* likely to get more than he that has none.—C.

THOUGH sometimes small evils, like invisible insects, inflict pain, and a single hair may stop a vast machine, yet the chief secret of comfort lies in not suffering trifles to vex one, and in prudently cultivating an undergrowth of small pleasures, since very few great ones, alas! are let on long leases.—SHARP.

THERE cannot be a more glorious object in creation, than a human being, replete with benevolence, meditating in what manner he might render himself most acceptable to his Creator, by doing most good to his creatures.—FIELDING.

THE PENDULUM. II.

IN our last paper we saw that, in ordinary circumstances, the time of the vibration of a pendulum-bob depends on the length of the string or rod of the pendulum; but that it does not follow the ratio of the length. If a seconds' pendulum be $39\frac{1}{4}$ inches long, a pendulum of half that length will not vibrate half-seconds. The time and length bear a relation, which we have thus expressed:—*the time varies according to the square root of the length, or the length according to the square of the time.* By this is meant, that the length of a pendulum to vibrate in a certain time, is to that of another pendulum vibrating in a different time, as the square of the time taken by the first pendulum is to the square of the time of the other. Thus, if the length of a seconds' pendulum be set down at *one yard,* then the length of one which will vibrate two seconds, must not be taken at *two* yards, but at the square of two, or *four* yards; and for a three seconds' pendulum, it will of course be nine yards. The length of a half-seconds' pendulum is one-fourth of the length of a seconds' pendulum; and that of a pendulum to vibrate three times in a second is one-ninth of the same length.

It has been found by experiment, that at London, the length of a pendulum vibrating once in a second, (or 86,400 times in a day, which can of course be determined by astronomical observations,) is 39·1393 inches. Consequently, the length of a pendulum to vibrate

					Inches.
In a quarter of	a second, is	$\frac{1}{16}$ of 39·1393		or	2·44620625
For a third	do.	$\frac{1}{9}$	do.	or	4·34881111
For half	do.	$\frac{1}{4}$	do.	or	9·784825
For a second					39·1393
For two seconds		4 times do.		or	156·5572

The pendulum of the clock of St. Paul's vibrates two seconds, and is therefore of the last mentioned length, or about thirteen feet.

In all these cases, we have talked of the *length* of a pendulum-rod, without explaining what is meant by that term. For rough experiments, it will be sufficient for the reader to measure from the point of suspension to the centre of the ball or bob of the pendulum, and call that the length. But this is not scientifically correct. The virtual length of a pendulum, or that on which its time of oscillation depends, is the distance from the point of suspension to an imaginary point called the *centre of oscillation.* To find this point requires a complex mathematical calculation; and its situation does not depend on the actual length alone of the pendulum. Its place is also influenced by the *comparative weight* of the different parts, but not by the *whole weight* of the mass. We shall merely state that its place depends, in great measure, on that of the *centre of gravity* of the whole pendulum. Now, of course, by lengthening the string of a pendulum, we lower the centre of gravity, and also the centre of oscillation, and, therefore, increase its virtual length; and the contrary takes place in shortening it.

We will now consider the pendulum of a clock as it is actually constructed, together with the *escapement,* or that part or *movement* of the clock, which connects the pendulum with the machinery, so as to keep the latter always going at the same uniform rate.

The mechanism of a clock (independent of the striking-machinery) may be briefly stated to consist of a barrel, or cylinder, A, on which is wound a cord carrying a weight, W. The manner in which this weight, by descending, turns the barrel, has already been shown in the articles on the MECHANICAL POWERS. Let the reader suppose it ensured that this barrel must revolve once in twelve hours. Then the axle B of the barrel may have a hand attached to it, which will revolve on a dial divided into twelve parts, each of which it will traverse in an hour. This is the hour-hand. Now, if on this axle a toothed wheel be fixed, working on another axle a pinion of one-twelfth of its own size, this latter axle will revolve once in an hour, and may be made to carry the minute-hand. By another step or two, another axle is made to revolve once in a minute, and this carries the second-hand. Thus, the whole clock consists of a train of multiplying wheels, like that described in our article on the WHEEL AND AXLE.

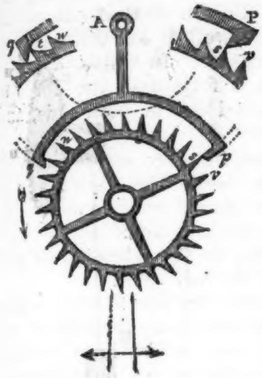
Fig. 7.

Now, if such a clock were wound up and set going, the weight would fall to the ground with great and increasing speed, dragging round the machinery still more rapidly. In a few minutes it would require to be wound up again, the wheels and hands having spun round as many times perhaps as in a common clock they do in a week. Such an instrument would evidently be of no use whatever as a time-keeper: the only point in which it would be correct would be in the *proportions* which the velocities of the different parts would have to each other. Thus, the minute-hand would revolve twelve times, while the hour-hand revolved once; and once, while the hour-hand moved through one division or hour-space. The second-hand would revolve sixty times, while the minute-hand revolved once; or once, while the minute-hand moved through one division or minute-space. But these portions of time would have no resemblance to real hours and minutes. What we want, therefore, is a *regulating power* which will allow these parts to revolve only with a certain *absolute* velocity; for their *relative* velocity is already given them by the prime *moving power,* that is, the gravity of the weight W.

Now, it matters not to what part of the machine this regulating power be applied; for if we regulate one wheel, or give it its proper absolute velocity, all the others must necessarily have theirs also. So that the second-hand, the minute-hand, and the hour-hand will likewise have their relative velocities to each other, on account of the relative sizes of the various wheels by which they are connected.

The regulating power commonly employed, is the PENDULUM, P, which acts on, and is acted on by, the axle of the second-hand, along the rod M N, through the intervention of a peculiar contrivance called an *escapement.* The pendulum in the foregoing figure, is suspended from E, and communicates its motion to the ratchet at C, by means of the bent wire D; but the following figure shows this, the most common and simple form of escapement, with a front and enlarged view. We should not, however, omit to mention that there are a great many more complicated forms contrived to remedy certain defects, into the consideration of which we cannot here enter, as they pertain more properly to the art of watch-making.

Fig. 8.



The wheel represented in this figure is called the *swing wheel*, and is fixed on the arbor, or axis, which bears the second-hand. The object is, therefore, to make it revolve once in a minute; and it has thirty teeth of the form shown in the engraving. Above this is a metal arc, suspended from the axis A, so as to swing freely backwards and forwards. The pendulum is placed behind this apparatus, as shown in fig. 7; and the fixed point from which it hangs is quite unconnected with any moving part of the clock; as it is essential that the point of suspension should be free from any shaking or unsteadiness. The oscillations of the pendulum, however, are communicated to the arc, or ratchet, by means of the bent wire which connects the latter at A, with the rod of the pendulum. At the two ends of the arc are two peculiarly shaped projections *p q*, called *pallets*; and when the arc is swung backwards and forwards, they fall by turns into the intervals between the teeth of the swing-wheel; thus stopping the wheel, and only allowing it to move through the space of one tooth, during each double oscillation of the pendulum.

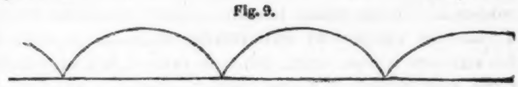
In the figure, the arc is supposed to be moving out at the right, and the pendulum to be almost arrived at the end of its oscillation. The pallet *q* is falling in between two teeth, so as to stop the wheel; while the pallet *p* is raised clear of the tooth *s*. Now, when the pendulum returns towards the left, the arc will move out at *q*, and the pallet *q* will be raised clear of the tooth, which is now pressing against it. This tooth will consequently pass on in the direction indicated by the arrow; that being the constant direction in which the wheel is urged on by the *maintaining power* of the weight. It is from this *escaping* of the teeth in succession from the restraint of the pallets, that this contrivance obtains the name of *escapement*.

But more than one tooth cannot escape at once; for during the oscillation of the pendulum to the left, as soon as the pallet *q* has been raised free of the tooth pressing against it, the pallet *p* slides down the sloping side of the tooth *s*, into the space between the teeth *s* and *v*, and the wheel is again stopped. The pendulum now begins another oscillation to the right, the pallet *q* falls into the next space, and keeps the wheel stopped; while the pallet *p* is again raised free of the wheel. When the next oscillation to the left begins, the former action is repeated. Hence, if the pendulum vibrate seconds, one tooth will escape during each double oscillation of the pendulum, or every two seconds; and, therefore, if the wheel have thirty teeth, it will perform a complete revolution in a minute; and of course, all the other parts of the machine have their proper velocities. Besides this action of the pendulum on the swing-wheel, the latter acts on the pendulum; for each tooth, before it escapes, presses on one of the pallets *p q*, and thus restores to it that force, which it would otherwise have lost by friction, and the resistance of the air. In this manner, if the moving and regulating powers be properly proportioned to each other, the latter will not only restrain and equalize the former, but the former will maintain the latter in a state of constant oscillation, without any diminution in the extent of such oscillation.

From what has been said before, we can easily understand, that, if a clock *loses*, we must shorten the pendulum-wire,—and lengthen it if the clock *gains*. This is done, in effect, by raising or lowering the bob of the pendulum, (P, fig. 7,) by turning the screw at the bottom.

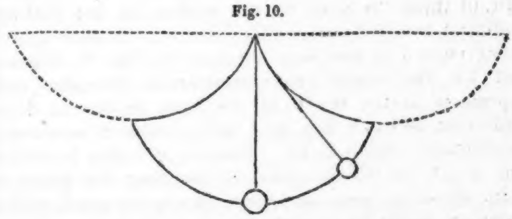
We have stated in the former paper, that the oscillations of a pendulum, however they may vary in size, are *isochronous*, or equal in time. This, however, is not strictly correct in the case of the common pendulum, whose oscillations must necessarily be arcs of circles. It has been proved mathematically, that, in order that a pendulum may be perfectly isochronous, it must not move in a circular arc, but in a peculiar curve called a *cycloid*. This curve is the path described by a point, which revolves round a centre, which centre is at the same time moving on in a straight line. Thus, every point in the circumference of a coach-wheel, or any other *rolling* body, describes a succession of curves like the following, which are *cycloids*.

Fig. 9.



These curves are drawn by fixing a small piece of black-lead to the edge of a sixpence, or any other flat round body, and rolling it along on the edge of a ruler, which coincides with the straight line on the paper. Now, if a weight, suspended from a string, be made to describe, in oscillating, part of one of these curves, (inverted, as in the following figure,) it will be a perfectly isochronous pendulum, whether it describe the whole of the curve or only a small part; so that we should not need to keep the oscillations always equal in length, as in common clocks.

Fig. 10.



Now, if the rod of a pendulum be solid and inflexible, it can evidently describe no other curve but a circle, because it is always kept at the same distance from its centre, which is the point of suspension.

But if the rod be composed of string or any other flexible substance, we can make it describe any curve we please, by enclosing the upper part between two curved surfaces called *cheeks*, as represented in fig. 10. The string of the pendulum is thus bent, or partially wound on these surfaces, so as continually to alter the distance of the centre of oscillation from the point of suspension. The curve described by the pendulum then depends on that of the cheeks. If the motion of the pendulum is to be cycloidal, and therefore isochronous, cycloidal cheeks must be provided; each being half a cycloid of the same size and shape as the cycloid described by the pendulum. The advantages of such a pendulum would be very great; for its oscillations would occupy no longer time when they took in the whole cycloid, than when they constituted only a small part of it.

There are, however, serious practical difficulties, which render this form of pendulum incompatible with the various advantages of the common form; so that,

on the whole, though perfect in theory, it is not adapted to practice. And when we consider how nearly isochronous the common pendulum is, even in its worst form, we shall find that we may dispense with the extra advantage gained by a cycloidal pendulum; especially when we remember that, as long as the beats of any pendulum are equal in size, they must be isochronous. Now, in a good clock, the beats of the pendulum can hardly differ in size appreciably; though any such difference of time might be calculated, but not perceived.

MATERIALS FOR THE TOILETTE.

No. VI.

On Hair-Brushes.

In considering such articles as may be reckoned necessary appendages to the toilette, we must not pass over the different kinds of brushes which are in use for the cleansing and preservation of the clothes, the hair and the teeth. Their fabrication is so extremely simple that we need not occupy much space in describing it. The common method is this: when the piece of wood in which the hairs are to be placed is cut to the size and shape required, it is drilled full of small holes, and in each of these holes is placed a bundle of hairs folded together, so that the ends shall all project on one side, while on the other they are secured by means of wire passed through the bent part. With the addition of glue, which is placed in the holes to keep the bundles firm, they are now perfectly secured; but the back of the brush has an unsightly appearance, and it is necessary to cover the rough surface formed by the wire-work and the projecting parts of the hair. For this purpose, in the case of clothes and hair-brushes, a thin coating of some finely polished wood is often *veneered* upon the back of the brush, or, in other words, a thin plate of fancy wood is laid down in glue, on the surface of the plainer material.

In 1830 a patent was obtained by Mr. T. Mason, for an improvement in the manufacture of brushes, and by his invention the hairs are more firmly fixed in the stock of the brush, and the process of veneering is rendered unnecessary. Instead of holes drilled in the wood for the purpose of securing the knots of hair, there are grooves formed like a dove-tail, wider at the bottom than at the top, and into these, after dipping them into cement, the ends of the bundles of hair are placed. A pair of pliers is then used to press the ends of the hair into the recess, or wider part of the dove-tailed groove, where the cement will cause them to adhere firmly to the stock of the brush. These grooves may be formed with threads or teeth at the sides, instead of being dovetailed, and into these threads or teeth the hair will be forced by compression. The knots of hair are successively placed in the groove, and forced up by a tool against the last knot put in, and so on, until the grooves are filled. A metal ferule is often placed on the outside of the stock of the brush, and secured by pins or rivets.

The kinds of brush in common use, as well as the shapes in which they are made, are various: the hair employed in their construction also differs according to the purpose for which the brushes are required. Thus we have round, flat or square brushes: brushes for the clothes, for the head, for horses; for the use of weavers, painters, &c. The flesh-brush is applied as a remedy for rheumatism, as well for certain cutaneous disorders. The wire-brush, as formed of brass or ironwires, is used by silversmiths and gilders for scrubbing silver, copper or brass, previous to gilding them. There is a method of raising a colour on leather, by only rubbing the skin with a brush. The French leather-gilders call it *broussure*, and it is the lowest of all the forms of dye allowed by their statutes. In China, a brush is used by painters which is formed of the fibres of some plank; these are fretted out at both ends, and then tied together for use.

We are chiefly concerned, however, at present with brushes appropriated to the uses of the toilette, and as we have already described their general construction, we now devote our attention to the use of hair-brushes in particular. But first let us say a few words respecting the physiology of the hair itself.

Each hair is contained in a delicate sheath, which dilates into a small pouch, containing the bulb of the hair. The soft pulp which this bulb encloses, consists apparently of blood-vessels and nerves: on the surface of the bulb, the substance forming the hair is secreted, and as each layer pushes forward the succeeding one, the substance gradually advances along the sheath, and projecting beyond the skin grows freely beyond it. Each of the sheaths containing the hair is supplied with one or two little glands, where oil is secreted to lubricate the hair, and keep it supple. Possessing neither vessels nor nerves, except at their base, hairs are seldom altered, except by diseases of the skin. Their loss of colour, which arises from a deficiency in the secretion of colouring oil, is sometimes very rapid, and can rarely be remedied. When a due supply of moisture is not obtained, the hair grows brittle, and will split at the points, or break off at the middle of its length. There is a distressing disease which occurs almost exclusively in some towns in Poland, and is on that account called *plica polonica*, in which the hair of the head becomes sensitive of pain, and is said to bleed when cut. This sad complaint is accompanied with general disease of body, and often proves fatal to those afflicted by it.

On the state of the skin of the head must necessarily depend, in a great measure, the beauty and preservation of the hair; for the hair is nourished by the blood-vessels placed in this organ, and the substance of which it is formed is secreted from the same. If the skin be neglected, the hair usually becomes weak, and falls off, but if the healthy action of the former be restored, the hair is also strengthened. We all know that sickness and disease will impair the beauty of the hair, and that its strength and thickness greatly depend on the general health of the body. But in many cases, the hair grows weak and thin, at an early age, without any apparent cause, and we cannot but entertain the opinion that this evil (for an evil it is to lose so graceful a covering to the head,) might be in a great measure prevented by a proper attention to the state of the skin, and by preventing the accumulation of the epidermal scales, which in some individuals are so long neglected as to be very difficult to remove. For this purpose the daily use of a hair-brush which is sufficiently penetrating to reach the skin, should not be omitted, or slightly employed. The longer the hair is, the more necessary is this operation, and the greater should be the length of time devoted to it, so that for those who are not inclined to give considerable attention to the state of their hair, we would recommend the wearing it as short as possible, when the trouble of reaching the roots will be less, and it will be easy to keep the skin of the head in a healthy state. The constant use of the brush will, in many cases, be sufficient to preserve the glossy appearance of the hair, without the application of pomatums or oil, but where they are absolutely necessary, still let them be employed sparingly, for a state of greasiness

is not natural to the hair, and instead of strengthening and improving it, it has a directly contrary effect. In using any unguent, the best way of applying it is to imbue with it a very soft hair-brush, and so diffuse it equally through the hair, after which, a harder brush may be used with advantage.

Of the various sorts of pomatums used for the hair the usual base is hogs' lard. That which is called bears' grease, is sometimes composed of the same material in a rancid state. Perhaps the consistence of these unguents resembles more nearly the natural oily secretion at the roots of the hair, than do the more fluid preparations, and it is reasonable to suppose that they will on that account be more beneficial. A good pomatum may be prepared by taking of beef-marrow, hogs' lard, and spermaceti, each an ounce; of oil of ben a pint; melting the whole together; then straining through a linen bag and adding a dessert-spoonful of oil of bergamot, and of oil of roses, and of oil of nutmeg, each ten drops. Many of the sweet smelling oils sold by inferior perfumers in the metropolis, decked with French labels, are nothing more than olive oil or oil of turpentine, scented with a few drops of the volatile oil whose name is on the label. A good hair-oil may be prepared from a pint of oil of sweet almonds and an ounce of spermaceti, melted together, with the addition, when cold, of a table-spoonful of oil of bergamot.

The fangs of a bear, and the tusks of a wild boar, do not bite worse, and make deeper gashes, than a goosequill sometimes: no not even the badger himself, who is said to be so tenacious of his bite, that he will not give over his hold, till he feels his teeth meet, and the bones crack.—HOWELL.

He that spends to his proportion is as brave as a prince; and a prince exceeding that is a prodigal: there is no gallantry beyond what is fit and decent. A comely beauty is better than a painted one. Unseemly bounty is waste both of wealth and wit.—FELTHAM.

As we ought not to make the gratification of our external senses the main end of life, so neither ought we to indulge our taste for the more refined pleasures, those called the pleasures of imagination, without some bounds. The cultivation of a taste for propriety, beauty, and sublimity, in objects natural or artificial, particularly for the pleasures of music, painting, and poetry, is very proper in younger life; as it serves to draw off the attention from gross animal gratifications, and to bring us a step further into intellectual life, so as to lay a foundation for higher attainments. But if we stop here and devote our whole time and all our faculties to these objects, we shall certainly fall short of the proper end of life.—PRIESTLEY.

THE MANATI, or *Sea-Cow*, from ten to sixteen feet in length, has a head somewhat like a bull-dog, nostrils semilunar, and eyes very small and near the snout; it is without ears in outward appearance, but has two small spiracula situated at the back part of the head: mouth large, with soft and protracted lips, fitted for laying hold of the grass or herbage growing near the shore; neck short, and body covered with a rough, blackish skin, thinly sprinkled with bristly hair; the belly and sides near the tail, white. From the shoulders protrude two pectoral fins (the only fins on the animal,) resembling arms, with which it supports itself in the water, and which enables the female to give suck to its young (of which it only bears one at a time) who receives it from several porous openings or mammæ in the breast of the animal. The tail is formed like that of the whale. It is not an amphibious animal, never leaving the water, but feeding upon the aquatic plants and shrubs growing on the borders of the rivers and lakes, sometimes elevating its head to munch at the bushes which overhang them. Its flesh is white and delicate, resembling veal in appearance and taste, particularly when dressed, and it will keep good several weeks, even in the hot climate of which it is a native, when other meat will not resist putrefaction for as many days.—MARTIN'S *British Colonies.*

ELECTRICITY.

XIV.

ELECTRICAL EXPERIMENTS.

IN our last paper we enumerated a few of what are very appropriately termed, the mechanical effects of electricity. On the present occasion we propose to consider some of its chemical agencies.

And first of all let us give two or three examples of the extraordinary evolution of heat which accompanies even very feeble currents of electricity.

Having procured some cotton wool, wrap it loosely round one the balls of the *Universal Discharger*, and sprinkle on its surface some finely-powdered rosin. If a charge from a moderate-sized Leyden jar be now passed through the cotton, the rosin will be inflamed.

Dip cotton wool in oil of turpentine and pass a charge through it in the manner just described, and the turpentine will be inflamed.

Enclose in some cotton a very small piece of phosphorus, and attach it slightly to the conductor of the machine. On bringing a brass ball near to the cotton and passing a few sparks through it, the phosphorus will burst into a flame.

The manner of inflaming spirit of wine and ether has been already explained *.

Provide a bladder with a stop-cock attached, and fill it with coal-gas. Hold the orifice of the stop-cock within about an inch of the conductor; a small quantity of gas being at the same time permitted to escape. On setting the machine in motion, the sparks which pass from it to the stop-cock will ignite the gas. This experiment can be varied by receiving the electricity from the finger of a person in communication with the machine but standing on an insulating stool.

In a room fitted up with gas-burners the effect will appear still more remarkable, as the room may be lighted up in a few minutes in the manner just mentioned.

Procure a small (sheep's) bladder capable of containing from 5 to 10 cubic inches of gas. Fit up a sound cork with two pieces of copper wire, which must pass through it, having their ends bent at right angles, and approaching within about an eighth of an inch of each other, and terminating at the other ends in small hooks or rings. These arrangements being complete, let the bladder be filled with a mixture of hydrogen and oxygen gases, in the proportions of two volumes, by measure, of the former, to one volume of the latter. The cork should now be fastened securely into the neck of the bladder, and in such a way that the projecting points of the wires may be in free communication with the gas. The bladder being suspended from the ceiling or against the wall, (or, if proper precautions to prevent accidents be used, it may be held by the operator,) let conducting wires, be attached to those in the cork, one of which must communicate with the electrical machine and the other with the earth, and on causing a spark to pass through the bladder between the points of the wires, the gas will be inflamed, and explode with a loud report.

By their frequent recurrence we become so familiarized with the ordinary effects of heat upon inflammable bodies, that we hardly ever take the pains to investigate the true character of the phenomena, as presented in some of the most simple instances of combustion.

There is no example more instructive on this subject than that which is furnished by a common tallow candle. Let us for a moment examine into that what takes place when a candle is first lighted, and also

* See *Saturday Magazine*, Vol. XIV., p. 61.

during the subsequent stages of its combustion. A condition here necessary is that the wick be in contact, for a period longer or shorter according to circumstances, with a heated, or, as is more frequently the case, with a burning body. A candle may be lighted by contact with some particular substances which are at a bright red heat; but in this case the issue will depend on the quantity as well as the temperature of the heated body; a bar of iron, for instance, of an inch square being more effective than one of a quarter of an inch, although the temperatures of both may be alike. Experience teaches that a candle can be lighted more quickly by contact with a burning, by which we mean a *flaming*, body than by a substance at merely a red heat; whence it may, we think, be inferred that the specific temperature of flame, if it proceed from a narrow slip of paper or a single fibre of sewing-cotton, is greater than that exhibited by most, if not all, kinds of bodies at a red heat.

In lighting a candle the change effected is so sudden that it seems impossible there can be in the first act of ignition, or in its subsequent stages, anything resembling what in some other cases we denominate a series of results following each other at stated intervals. However difficult it may be, through the obtuseness of our perceptions, to recognise these results separately and in succession, yet it cannot be denied that they do actually occur in that manner.

The act of combustion (inflammation), implies that at one particular part the burning body has had its temperature very much raised, and, if it be a solid, that liquefaction and vaporization, as being processes preparatory to ignition, must have taken place. If it be a solid, as wood, for example, which is incapable of assuming a liquid form, we may imagine it to be converted into vapour. But under the circumstances we are describing the vapours of the most inflammable bodies are speedily changed, and by a new arrangement of their particles they become gases, and these, almost before we can conceive that they have a distinct existence, are destined to undergo separation and change by uniting with the oxygen of the atmosphere.

In a newly-lighted candle we observe first of all the heating of the wick. The liquefaction of the tallow immediately surrounding it next follows, then its vaporization, and finally its conversion into gas. The gas owes its inflammability to its union with oxygen, and from that union proceeds two different substances; one class of gaseous particles (hydrogen) by their union with oxygen constituting pure water, and the other (carbon), restored again to the vaporous form, by uniting with oxygen produces carbonic acid gas.

Hence, therefore, we conclude that the phenomena exhibited in the ordinary effects of heat, but especially in those effects upon inflammable bodies, are not only more complicated, but more curious and beautiful than many persons imagine; combustion not being one simple process, but consisting of several processes which follow each other in rapid succession; the origin as well as the results of these processes being perfectly distinct, although they may appear to be identical and simultaneous.

Let us now return to our electrical experiments; which we hope will be the better understood by what has just been said; for whilst contemplating the extraordinary energy of the electric spark as shown in the cases described at the commencement of this paper, we think it will be admitted that, in its mode of operation, as well as in the effects produced, there is a very striking analogy subsisting between electricity and heat.

If we examine attentively the conditions requisite to the successful issue of an electrical experiment, as the ignition of an inflammable body for instance, we find that the manipulations always have reference to the character or habits of the material operated upon.

Thus, in operating upon rosin, it is necessary that it be minutely divided; a condition more favourable to its sudden ignition than when in large masses. The use of the cotton wool is simply for retaining the rosin amongst its fibres; a convenient mode of presenting it to the action of the spark.

In the experiment with oil of turpentine, we need hardly mention that by being diffused over cotton its evaporation is greatly promoted, and hence it is the more easily inflamed.

We mentioned on a former occasion, when giving directions for inflaming spirits of wine, and ether, that the former requires to be warmed, and the latter does not, which is accounted for by the difference in their rates of evaporation.

Another circumstance which might be noticed, is, that in some instances the most feeble spark we can obtain is sufficient to cause ignition, whilst in others an accumulated charge is required. These are conditions, however, to which we attach but little importance, the difference being occasioned, perhaps, by the form, rather than by the composition of a substance.

These hints must suffice to indicate the general principles on which we may trace a resemblance between the effects of heat and of electricity, and whilst we endeavour to ascertain in what respects their modes of operation agree, it will be equally interesting to notice those which are dissimilar.

Wherever electricity is concerned, the suddenness of its action is sure to arrest attention. But are not the effects of heat, under favourable circumstances, produced with equal alacrity? As respects each of the inflammable bodies just now enumerated, we know that the smallest jet of flame we can procure, when presented to either of them under the most favourable conditions, is sufficient to cause instantaneous ignition.

Here we must break off. We have endeavoured to show that the electric spark, by causing the ignition of inflammable bodies, possesses properties analogous to those of heat. It has also been shown that combustion is not a simple process, but the result of several processes; part of which are accompanied by the decomposition, and others, by the recomposition of the elements of which the substance acted upon consists; and although these processes appear to us to be indivisible, yet we know they are distinct and follow each other in regular succession.

In the ignition of gaseous bodies, whether by the agency of heat or of electricity, the recomposition of the elements is the object attained. In the case of coal-gas, and of the explosive mixture of hydrogen and oxygen, there had been a decomposition by a previous process.

DARKNESS and light divide the course of time, and oblivion shares with memory a great part even of our living beings; we slightly remember our felicities, and the smartest strokes of affliction leave but short smart upon us. Sense endureth no extremities, and sorrows destroy us or themselves. To weep into stones are fables. Afflictions induce callosities; miseries are slippery, or fall like snow upon us, which, notwithstanding, is no unhappy stupidity. To be ignorant of evils to come, and forgetful of evils past, is a merciful provision of nature, whereby we digest the mixture of our few and evil days, and our delivered senses not relapsing into cutting remembrances, our sorrows are not kept raw by the edge of repetition.—SIR THOMAS BROWNE.

LONDON:
JOHN WILLIAM PARKER, WEST STRAND.
PUBLISHED IN WEEKLY NUMBERS, PRICE ONE PENNY, AND IN MONTHLY PARTS PRICE SIXPENCE.